Specification

Rotative Body of a Printing Press Comprising a Roll Face

The invention relates to rotating bodies of a printing press with a barrel in accordance with the preamble of claim 1, 4 or 36.

A cylinder of a printing group embodied as a hollow body is known from DE 41 19 824 C1 and DE 41 19 825 C1, wherein the cylinder consists of a one-piece cast body constituting an outer body and additionally has, if required, an inner one-piece rotationally-symmetrical cast body, wherein the two cast bodies are made, for example, of cast steel or gray cast iron and, in the case of DE 41 19 824 C1, are embodied in one piece by connecting strips, or are welded together.

A cylinder of a printing group made of gray cast iron is known from DE 42 12 790 A1, wherein, for increasing the bending resistance, an axially extending steel core has been cast, centered in the cylinder, which at the same time projects as a shaft journal out of the end faces of the cylinder, wherein the gray iron cast cylinder concentrically envelopes the steel core and has hollow spaces.

A cylinder of a printing group is known from DE 196 47 067 A1, which consists of a base body of gray cast iron or a light metal casting, wherein a cylinder core, which is preferably embodied hollow, has been cast as a stiffening means in the base body. The cylinder core consists, for example, of a steel pipe. Further reinforcing profiles, extending parallel with the longitudinal axis of the cylinder

and having a solid or hollow cross section, possibly of a non-uniform wall thickness, are arranged in a radially outward located area of the base body, are distributed over the circumference of this area and are preferably brought as closely as possible to the shell face of the base body. The stiffening means and all reinforcing profiles are closed off at their respective ends and are completely surrounded by the cast material of the base body.

A temperature-controllable double-shelled cylinder is known from Patent Publications DE 861 642 B and DE 929 839 B, wherein a heating or cooling medium, preferably air, is passed over a helix-like path within the double cylinder shell, wherein the inner cylinder and the outer cylinder are arranged coaxially at a radial distance of approximately 10 to 20 mm from each other.

A temperature-controllable counter-pressure cylinder is known from DE 20 55 584 A, which has heating chambers in its shell over the entire cylinder width, which are connected to a warm water circuit by means of an inflow line arranged axially in a cylinder journal and an outflow line conducted coaxially with the inflow line.

A temperature-controllable printing forme cylinder is known from DE 37 26 820 A1, whose interior is completely filled with a liquid, wherein the liquid passes through a first circuit extending outside of the printing forme cylinder, wherein a cooling pipe, which is preferably embodied to be coil-shaped, penetrates the liquid over the entire cylinder width, wherein a cooling medium which flows through the cooling tube and is connected to a second circuit, cools the liquid and therefore the cylinder.

A cylindrical rotating body for printing presses, which can be temperature-controlled by the introduction of water vapor, is known from DE 93 06 176 U1, wherein bores or lines, which extend along the rotating body closely under its shell face are arranged, wherein the bores or lines can have a course differing from the axial parallelism, and therefore can have a drop toward the center of the rotating body.

A temperature-controllable cylindrical rotating body for printing presses is known from DE 195 10 797 A1, wherein a coolant flows through the entire interior in only one cycle, and wherein it is provided at one side with a coolant feed device and a coolant flow-off device arranged in a cylinder journal and connected with a rotary lead-through.

A temperature-controllable printing forme cylinder is known from DE 199 57 943 A1, which in its interior has casting core chambers, which extend over the width of the cylinder and are closed off at the ends of the cylinder body by covers, wherein a pipe extending over the cylinder width is arranged in each chamber, wherein a sealingly displaceable pipe unit, which is connected with a rotary lead-through for the supply and removal of coolant, is arranged in an axial bore of a cylinder journal, wherein, at the end of the cylinder equipped with the pipe unit, every pipe is connected via a radial bore with the pipe unit, wherein supplied coolant flows through the pipes and flows into the hollow casting core chambers in the area of the oppositely located end of the cylinder and is conducted away from there via a radial bore connected with the pipe unit.

A temperature-controllable cylinder embodied with almost completely solid walls for a rotary printing group is

known from EP 0 557 245 A1, which has a first line along its rotary shaft, and closely underneath its shell face has several second lines, which are connected with the first line, are preferably arranged equidistant in the circumferential direction and extend parallel with the longitudinal axis, through which a fluid can flow for controlling the temperature of the shell face.

A temperature-controllable cylinder for a rotary printing group is known from EP 0 652 104 B1, which has a cylinder shell pipe, at each one of whose respective ends a flange is arranged, wherein a separating pipe and a feed pipe extend in the interior of the cylinder coaxially in relation to its length, wherein a hollow chamber between the separating pipe and the cylinder shell pipe constitutes a cooling chamber, through which a coolant supply via a feed pipe flows, wherein the line in the separating pipe is connected with the cooling chamber via connecting bores in one of the flanges.

A temperature-controllable cylinder for a rotary printing group is known from WO 01/26 902 A1 and WO 01/26 903 A1, which has a pipe-shaped or solid cylinder base body, which is surrounded by a pipe-shaped outer cylinder body, wherein, for controlling the temperature of the shell face, a channel is formed on the circumference of the cylinder base body, or in a gap between the cylinder base body and the outer cylinder body, through which a temperature-control medium can flow, wherein the channel can be embodied for example as an open gap with a ring-shaped clear profile, or as a groove revolving in a helical manner in the axial direction of the cylinder.

A heating or cooling roller with a roller body with peripheral bores axially in respect to the roller body for a fluid heat-conducting medium is known from DE 40 36 121 A1, wherein it is the object to achieve as uniform a temperature profile as possible over the entire roller body. One embodiment for the attainment of this object provides for lining the peripheral bores with heat-insulating materials, so that the amount of heat emitted by the heat-carrying medium to the roller per unit of length of peripheral bore is as constant as possible, in spite of resultant temperature differences in the heat-conducting medium, so that therefore the radial expansion and the temperature at the roller surface are as uniform as possible. To this end the insulating material is placed into the bores in such a way that the insulating material continuously changes the diameter of the bores. Thus, the heat transfer from the heat-conducting medium to the roller body over the length of the bores is maintained constant by means of the thickness of the insulating material introduced into the bores, in spite of a temperature drop occurring along the bores.

A device for dampening the non-printing locations on planographic printing plates in printing presses is known from DE 629 700 B, wherein a coolant flows through a cooling coil arranged in a plate cylinder, wherein the cooling coil is arranged in a space enclosing an inner part of the plate cylinder with the exception of the cylinder pit, in particular underneath the printing surface, wherein an insulating layer is arranged between the inner portion of the plate cylinder and the space with the cooling coil, wherein

the cooling coil is in metallic contact with the outer wall of the space which faces the printing surface.

A cylinder of a printing press is known from the later published DE 103 05 594 A1, wherein a cylinder is constructed of several layers and in one embodiment has an internal temperature-control device, embodied as a coolant line, for example, wherein the temperature-control device is arranged between a thermal insulation and a support surface for material to be imprinted, i.e. a preferably thin-walled cylinder shell, wherein the thermal insulation can be made of a dimensionally stable material, for example a metal foam or a ceramic material or, if it has been divided into segments, for example, of a felt or fiber material. DE 103 05 594 A1 expressly does not relate to printing forme cylinders, rubber blanket cylinders and inking unit rollers.

The object of the invention is based on producing rotating bodies of a printing press with a barrel.

In accordance with the invention, this object is attained by means of the characteristics of claim 1, 4 or 36.

The advantages to be gained by means of the invention reside in particular in that in a cylinder or a roller with a barrel, which has a base body, and with an outer body arranged radially downstream of and at least partially covering the latter, the base body and the outer body are thermally insulated from each other, which is of particular advantage if at least one channel, through which a medium for temperature control flows, is arranged in the barrel, and a rapidly reacting and as uniform as possible temperature control of the shell face of the barrel can be achieved. It

is thus possible by means of the proposed attainment to increase the efficiency of the heat exchange between the temperature control medium and the outer body, or the shell of the barrel. Furthermore, the thermal insulation can be produced in a simple way, for example by means of casting techniques. The barrel as a whole can also be produced simply and cost-effectively. By optionally proposed geometric designs of the channels it is possible to maintain the effect of the temperature-control medium approximately constant during is flow through the barrel.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are in - in Figs. 1 to 7 respectively in longitudinal section and cross section:

Fig. 1, a rotating body of a printing press in accordance with a first embodiment with axially extending hollow bodies,

Fig. 2, a rotating body of a printing press in accordance with a first embodiment with a hollow body extending in a helical line,

Fig. 3, a rotating body of a printing press in accordance with a second embodiment with a body sealed in a barrel and containing a channel,

Fig. 4, a rotating body of a printing press in accordance with a third embodiment with a base body and a solid outer body attached to it, wherein hollow spaces have been cut in the outer body, which are open toward the base body,

Fig. 5, a rotating body of a printing press in accordance with a variation of a third embodiment with a base body and a solid outer body attached to it, wherein hollow spaces have been cut in the outer body, which are covered by the outer body,

Fig. 6a, a rotating body of a printing press in accordance with a fourth embodiment with a channel formed in a space between a base body and an outer body,

Fig. 6b, a rotating body of a printing press in accordance with a fourth embodiment with a a channel formed in a space between a base body and an outer body,

Fig. 7, a rotating body of a printing press in accordance with a fifth embodiment with a high-strength shaft introduced into the barrel,

Fig. 8, an embodiment of a hollow body or a channel of a rotating body with a temperature-controlled shell face, wherein the heat exchange between the shell face and the temperature-control medium is constant,

Fig. 9, a longitudinal section through a rotating body with a base body and an outer body and a sleeve, which is arranged between the base body and the outer body and has flow channels,

Fig. 10, a cross section through the rotating body represented in Fig. 9,

Fig. 11, a perspective view of the sleeve arranged between the base body and the outer body with the flow channels.

Figs. 1 and 2 show a first embodiment of a rotating body 01 of a printing press. The rotating body 01 has a

barrel 02, or a barrel 02 with a base body 17, wherein at least the base body 17 is made of a cast material, wherein the barrel 02, or its base body 17, has an axial length L and in its outer area, i.e. closely underneath its shell face 07, has at least one sealed-in pipe-shaped hollow body 03, 04 enclosed in cast material, and wherein the hollow body 03, 04 extends over the entire length L of the barrel 02, or its base body 17. In accordance with Fig. 1, the hollow body 03, 04 can extend for example parallel with a longitudinal axis 06 of the rotating body 01 or - as represented in Fig. 2 - can extend through the outer area of the barrel 02, or its base body 17 from one end to the other end 11 in a helical line. In the longitudinal section in Fig. 2, the helical course of the hollow body 03 has been drawn in in dash-dotted lines for easier understanding of the representation. Regardless of this course, the hollow body 03, 04 forms a channel, through which a temperature-control medium, i.e. a flow medium for controlling the temperature of at least the shell face 07 of the barrel 02, can flow, wherein the temperature-control medium preferably is a liquid heat-conducting medium such as water or an oil, for example.

For introducing the flow medium into, or removing it from the barrel 02, the hollow body 03 can be connected with lines 08, 09, which can be attached to the ends of the barrel 02 for example, or can be introduced there into a flange 36 in the shape of an annular groove 37 (Fig. 2). Also, in the case of several hollow bodies 03, 04 arranged in the barrel 02, or its base body 17, these, as well as the lines 08, 09 connected with them, can advantageously have a common connector on one of the ends 11 of the barrel 02.

It is advantageous for good temperature control to arrange the hollow body 03, 04 with its contact face A07, which is relevant for heat exchange, closely, i.e. only a few millimeters, preferably less than 20 mm, underneath the shell face 07 of the barrel 02. If several hollow bodies 03, 04 are arranged along the circumference U of the barrel 02, it is advantageous if the temperature-control medium flows in counterflow through adjacent hollow bodies 03, 04. If several hollow bodies 03, 04 are provided in the outer area of the barrel 02, or its base body 17, it is advantageous to arrange all hollow bodies 03, 04 at the same radial distance a3, a4 from the longitudinal axis 06 of the rotating body 01, as well as equidistant in the direction of the circumference U of the barrel 02, so that as uniform a temperature control as possible of the shell face 07 of the barrel 02 can be achieved.

The hollow body 03, 04 in the rotating body 01, which has been produced by means of casting techniques, has a narrow interior diameter D3, D4, wherein the interior diameter D3, D4 preferably is less than 25 mm, in particular between 15 mm and 20 mm. A channel of such a narrow interior diameter D3, D4 is difficult to produce in casting technology by the insertion of a casting core into a barrel 02, or base body 17, to be cast, because of which it was attempted to drill such a channel into the barrel 02, or its base body 17 which, however, is expensive over the length L of the barrel 02, or its base body 17 and is not without problems in its technical execution.

It is therefore proposed by means of the first embodiment of a rotating body 01 to insert a pipe-shaped

hollow body 03, 04, i.e. a hollow body 03, 04 embodied as a pipe, preferably as a steel pipe, into a casting mold for the barrel 02, or its base body 17, and to cast around it. So that during the casting process for the barrel 02, or its base body 17, the hollow body 03, 04 does not become soft as a result of its being heated by means of a temperature action of the molten material of the barrel 02, or its base body 17, and becomes deformed, it is necessary to embody the hollow body 03, 04 comparatively thick-walled in respect to its inner diameter D3, D4, so that a wall thickness of the hollow body 03, 04 preferably is at least one-fifth of the inner diameters D3, D4. Thus, a suitable wall thickness of the pipe-shaped hollow body 03, 04 is preferably at least 3 mm, in particular between 5 mm and 6 mm. Furthermore, the pipe-shaped hollow body 03, 04 can also be fixed in place and stabilized in the casting mold for the barrel 02, or its base body 17, by support elements.

In accordance with Fig. 2, the barrel 02, or its base element 17, can be embodied as a hollow cylinder 02, into whose ring-shaped wall the pipe-shaped hollow body 03, 04 is sealed. In the printing press, in particular an offset printing press, the hollow body 01 can be used as a cylinder 01 guiding a material to be imprinted, or as a roller 01 guiding a material to be imprinted, or as a roller 01 in an inking unit or a dampening unit.

If, for example, the rotating body 01 is designed as a cylinder 01 of a printing group, this cylinder 01 can be designed, for example, as a forme cylinder 01 or a transfer cylinder 01 of an offset printing press, wherein this cylinder 01 can be covered in the direction of its

circumference U with, for example, one dressing or two dressings, and axially, i.e. over its length, for example with up to six dressings. In connection with a forme cylinder 01, the dressings are mostly embodied as plate-shaped printing formes. In connection with a transfer cylinder 01, the dressings are preferably rubber printing blankets applied to a support plate. As a rule a plate-shaped printing forme, or a support plate for a rubber printing blanket, is made of a flexible, but otherwise dimensionally-stable material, for example an aluminum alloy.

The printing group in which the previously described cylinder 01 is employed can be designed, for example, as a 9-cylinder satellite printing unit, in which four pairs, each consisting of a forme cylinder 01 and a transfer cylinder 01, are arranged around a common counter-pressure cylinder, wherein for example at least the forme cylinders 01 each can have the characteristics of the attainment of the object described here. Arrangements are advantageous, in particular for printing newspapers, in which a forme cylinder 01 is covered in its axial direction side-by-side with up to six plate-shaped printing formes, and along its circumference U either with one plate-shaped printing forme or, one behind the other, with two plate-shaped printing formes. Such a forme cylinder 01 rolls off on a transfer cylinder 01 which, for example, is covered axially with up to three side-by-side arranged rubber printing blankets, wherein each rubber printing blanket stretches over the full circumference U of the transfer cylinder 01. Thus, as a rule the rubber printing blankets have twice the width and length of the plate-shaped printing formes which are used for the forme

cylinder 01 acting together with the transfer cylinder 01. In this case the forme cylinder 01 and the transfer cylinder 01 preferably have the same geometric dimensions in respect to their axial length and their circumference U. For example, a rotating body 01 embodied as a cylinder 01 has a diameter D2 of 140 mm to 420 mm, for example, preferably between 280 mm and 340 mm. The axial length of the barrel 02 of the cylinder lies, for example, in the range of 500 mm to 2400 mm, preferably between 1200 mm and 1700 mm.

The explanations provided here regarding the design and employment of the rotating body 01 are intended to apply in a corresponding manner to all embodiments hereinafter described.

As represented in Fig. 3, a second embodiment of the proposed rotating body 01 of a printing press can provide that at least one body 12 is arranged in the barrel 02 of the rotating body 01, or at least in a base body 17 of the barrel 02 made from a castable material, wherein in a section transversely to the axial direction of the rotating body 01 the body 12 is bordered by two self-contained demarcation faces A13', A13", which are spaced apart from each other in the radial direction of the rotating body 01, wherein both demarcation faces A13', A13" border the material of the barrel 02 with their sides facing away from the body 12, and wherein, in an interior 13 of the body 12, which is bordered by the demarcation faces A13', A13", at least one channel 14, 16, which is bordered by the material of the body 12 and extends in the axial direction of the rotating body 01, is formed.

In this case the body 12 can be designed as a cast part produced by means of casting technology, i.e. as a precast component, wherein the cast part has at least one hollow space in its interior 13 for the formation of at least one channel 14, 16. Alternatively, the body 12 can also be a stamped or continuously cast product. The body 12 is made of a strong material, wherein a hollow space is formed in this body, preferably close to its demarcation face A13' facing the shell face 07 of the barrel 02, wherein the hollow space is bordered by the material of the body 12 at least in its longitudinal direction. Preferably the body 12 is homogeneous and is embodied as one piece, or also in several pieces, in the direction of the circumference U of the rotating body 01.

The body 12 advantageously is made of a heat-resistant material, for example a ceramic material or a hardened metal foam. The heat resistance is necessary so that the body 12 is not deformed when molten material of the barrel is cast around it for producing the rotating body 01. An implementation of the body 12, which is simple in manufacturing technology terms, into the barrel 02 of the rotating body 01 results, if at least the barrel 02, or its base body 17 are made of a cast material, for example of metal, ceramics, glass or plastic, and the body 12 is sealed in the barrel 02, or its base body 17 and is enclosed by the cast material. For this purpose, in the course of the production process the body 12 can be placed into the casting mold for casting the barrel 02, preferably in the outer area of the barrel 02, fixed in place with the possible aid of

support elements, and sealed so that the body 12 is completely enclosed in the casting material of the barrel 02. In a case of a ring-shaped embodiment of the body 12, the space it encloses is preferably filled by the casting material of the barrel 02, the body 12 is at least surrounded by the casting material.

Since a temperature-control medium can flow through the channel 14, 16 in the interior 13 of the body 12 in order to control the temperature in at least a partial area of the shell face 07 of the barrel 02, the body 12 is advantageously arranged in the outer area of the barrel 02. If the entire shell face 07 of the barrel 02 must be temperature-controlled, the body 12 with its channel 14, 16 advantageously extends over the entire length L of the barrel 02. At least the partial area of the shell face 07 of the barrel 02 corresponding to the area for printing on the shell face 07 of the barrel 02 must be temperature-controlled. As in the first exemplary embodiment, the rotating body 01 can again be a cylinder 01 for guiding material to be imprinted, or a roller 01 guiding a material to be imprinted.

A further advantageous embodiment of the body 12 lies in designing it to be cylinder-shaped, i.e. to preferably match the length of the body 12 to the length L of the barrel 02. Therefore the body 12 preferably has the shape of a hollow cylinder, wherein the space enclosed by it can be filled with the material of the barrel 02. In this case the body 12 preferably encloses the longitudinal axis 06 of the rotating body 01. The channel 14, 16 extending in the axial direction of the rotating body 01 can, similar to the example represented in Figs. 1 and 2, extend parallel in relation to

the longitudinal axis 06 of the rotating body 01, or also helically in the outer area of the barrel 02, or of the base body 17. If several channels 14, 16 are provided in the body 12, the temperature-control medium can pass in counterflow through adjacent channels 14, 16.

In the two embodiments of the proposed rotating body 01 so far described, is has been assumed for the sake of simplicity, and without restricting the invention, that the rotating body 01 is homogeneously designed, the barrel 02 does not have any layered construction which is concentric in respect to the shell face 07. Otherwise a distinction would always have to be made between the barrel 02 and its base body 17, wherein the base body 17 and an outer body 19 surrounding it constitute the barrel 02. But here the description is intended to apply to both embodiments.

A third embodiment of the proposed rotating body 01 of a printing press is shown in Fig. 4. The barrel 02 of this rotating body 01 consists at least of a base body 17 with a cylindrical surface 18, wherein at least one outer body 19 has been applied to the surface 18 of the base body 17, and the outer body 19 preferably consists of at least one curved element, whose associated central angle α is less than 360° so that, in particular in connection with a rotating body 01 embodied as a forme cylinder 01 or a transfer cylinder 01, the outer body 19 does not form a closed ring in its cross section, but instead has at least one gap 20 which can, for example in connection with a holding device not represented in Fig. 4, be used for holding dressings applied to the rotating body 01. However, in connection with rollers which are not to be covered with a dressing, the outer body 19 can

be embodied as a closed ring, which encloses the base body 17 and is connected with the surface 18 of the latter. Alternatively to the mentioned embodiment, several outer bodies 19 can also be applied to the surface 18 of the base body 17, wherein the outer bodies 19 are arranged on the surface 18 of the base body 17 in the direction of the circumference U of the base body 17. In the latter case, each outer body 19 consists of a curved element, wherein the central angles αi (i is a counting index of the curved elements), which belong to the curved elements, complement each other to no more than 360°. In particular, two curved elements can be arranged, preferably symmetrically in respect to each other, at the circumference U of the base body 17, wherein the central angle αi (i is a counting index of the curved elements) of each curved element preferably is slightly less than 180°. It is thus possible to provide curved elements of the outer body 19 for example in the form of half-shells or quarter-shells. A gap 20 between individual curved elements of the outer body 19 can be a slit-shaped opening toward a bracing channel, for example arranged in the base body 17, with the previously mentioned holding device, wherein the gap 20 can have a gap width of, for example, less than 3 mm, preferably 1 mm to 2 mm. In both cases of the last mentioned embodiment (Fig. 4), at least one hollow space 21 is provided in the outer body 19, wherein the hollow space 21 is open toward the surface 18 of the base body 17. The outer body 19 constitutes the outermost component of the barrel 02, wherein the outer surface of the outer body 19 constituting the shell face of the barrel 02 can be covered with one or several dressings,

wherein the dressing, or dressings, are each maintained on the rotating body 01 by means of the holding device arranged in the barrel 02, in particular in its base body 17, in a bracing channel. If the outer body 19 is embodied as multi-part, preferably at least two curved elements with a central angle αi (i is a counting index of the curved elements) of at most 180°, the advantage arises in the course of producing the rotating body 01 that it is not necessary to introduce the base body 17 with an exact fit into the outer body 19, and that instead the curved elements can be applied to the surface 18 of the base body 17 by means of a suitable releasable, or preferably non-releasable connecting technique, for example by means of screws or by welding.

However, as seen in Fig. 5, the rotating body 01 can also be designed in such a way that its barrel 02 consists of at least one base body with a cylindrical surface 18, wherein a hollow space 21, open toward the surface 18 of the base body 17, is provided in the base body 17, wherein an outer body 10 attached to the surface 18 of the base body 17 covers the hollow space 21, wherein the outer body 19 consists of a curved element, whose associated central angle α is less than 360°. With this variation the barrel 02 of the rotating body 01 can alternatively consist of a base body 17 with a cylindrical surface 18, wherein several hollow spaces 21, which are open toward the surface 18 of the base body 17, are provided in the base body 17, wherein several outer bodies 19 are arranged on the surface 18 of the base body 17 in the direction of the circumference U of the base body 17, and the outer bodies 19 attached to the surface 18 of the base body 17 cover the respective hollow spaces 21. In the latter case

each outer body 19 consists of a curved element, wherein the central angles αi (i is a counting index of the curved elements) which belong to the curved elements, complement each other to no more than 360°.

With a rotating body 01 in accordance with the third embodiment (Figs. 4 and 5), namely a rotating body 01 consisting of a base body 17 with a massive, in particular not compressibly embodied outer body 19 of constant radial thickness d19 attached to the base body 17, the outer body 19 can be glued, welded or screwed, for example, to the surface 18 of the base body 17. Accordingly, the outer body 19 can be attached permanently or releasably to the surface 18 of the base body 17. Electron beam welding methods or laser beam welding methods are particularly suited as welding processes. In this case it can be sufficient for fastening the outer body 19 on the base body 17 if the outer body 19 is connected as a material-to-material connection or a positive connection with the surface 18 of the base body 17 only at the ends 11 of the barrel 02 in the mentioned way, so that a welding seam, for example, need not extend over the entire length L of the rotating body 01, and instead is embodied for example only in the form of points, or several short sections of only a few millimeters length, which are spaced apart from each other. The welded sections can for example be 5 mm to 25 mm long, preferably approximately 10 mm long, and can be repeated at distances of 20 mm to 50 mm, preferably 30 mm to 40 mm, in the axial direction of the rotating body 01.

The rotating body 01 can be designed in such a way that at least the base body 17 - if desired together with journals 22, 23 for seating and driving the rotating body 01, formed

at the ends 11 of the barrel - is forged, or that at least the outer body 19 is made of steel. In the preferred embodiment it is provided that a temperature-control medium flows through the hollow space 21, which can be cut by milling into the base body 17 or an inside 24 of the outer body 19, for example, for controlling the temperature of the shell face 07 of the barrel 02. Therefore the hollow space 21 constitutes a channel 21 for the temperature-control medium, wherein the hollow space 21 can be arranged in the barrel 02 in such a way that the access of angled-off ends of dressings to be placed on the shell face 07 of the barrel 02 to a bracing channel arranged in the customary manner in the base body 17 is not hindered. A slit-shaped opening of a slit width S of less than 3 mm at the shell face 07 of the barrel 02 and extending axially in respect to the rotating body 01, is sufficient for this access. Thus the base body 17 and the outer body 19 are joined in such a way that they seal the hollow space 21. The hollow space 21 can be aligned axially in respect to the barrel 02, or can extend in a meander-like manner along the length L of the barrel 02. If several hollow spaces 21 are provided, it is advantageous to arrange them equidistant from each other along the circumference U of the barrel 02. As in the previously described example, the rotating body 01 can be a cylinder 01 for guiding material to be imprinted, or a roller 01 for guiding material to be imprinted.

A variation of the third embodiment (Fig. 4, however without the gap 20 in the outer body 19), relates to a rotating body 01 of a printing press with a barrel 02, wherein the barrel 02 has at least one base body 17 with a

cylindrical surface 18 and an outer body 19 which completely surrounds the surface 18 of the base body 17, wherein the rotating body 01 is distinguished in that the outer body 19 has in its inside 24 at least one channel 21 open toward the surface 18 of the base body 17. The outer body 19 here preferably rests on the surface 18 of the base body 17. The outer body 19 and the base body 17 can be placed atop each other, for example with a press fit. In this embodiment with a self-contained ring-shaped outer body 19 it is possible, following the application and fastening of the outer body 19 on the surface 18 of the base body 17, to cut, for example by milling and as required, a gap 20 and an associated bracing channel, or also several gaps 20 and associated bracing channels, into the rotating body 01, preferably at a location where no channel 21 is formed on the outer body 19. The gap 20 need not extend over the entire length L of the barrel 02, so that the outer body 19 remains free of gaps, at least at the ends 11 of the barrel 02, and therefore remains connected.

Regarding a fourth embodiment of the proposed rotating body 01, first the method of producing it will be explained. This method starts - as can be seen in Figs. 6a and 6b - with a rotating body 01 of a printing press with a barrel 02, wherein the barrel 02 has at least one base body 17 with a cylindrical surface 18, and an outer body 19, which can surround the surface 18 of the base body 17 at a distance a19. The method is distinguished in that at least one strip 26, made of a material which can be liquefied by heating, is attached to the inside 24 of the outer body 19, or to the surface 18 of the base body 17, that then the outer body 19

and the base body 17 are mounted, coaxially covering each other in that they are preferably pushed onto each other, that thereafter a hollow space 27 remaining between the base body 17 and the outer body 19 - namely at a location where there is no strip 26 - is filled with a hardenable casting material, and that finally, following the hardening of the casting material, at least the outer body 19 is heated in such a way that the material of the strip 26 is liquefied and removed from the space 27 between the base body 17 and the outer body 19. In this case the material of the strip 26 can, for example, be plastic or wax. A synthetic resin, preferably a two-component resin, which solidifies and hardens for example at room temperature or at a temperature up to 100°C, is suited as the casting material for filling the space 27 between the base body 17 and the outer body 19, for example. A melting point of the casting material, which can for example lie at 350°C, must in any case be higher than a melting point of the strip 26, which can for example lie at 150°C. In this way is it provided that, by means of the synthetic resin placed into the space 27 between the base body 17 and the outer body 19, the outer body 19 is firmly connected with the base body 17. However, as an alternative to the synthetic resin, an aluminum foam which hardens, can also be suitable for filling the space 27.

After the at least one strip 26 arranged between the base body 17 and the outer body 19 has been removed, preferably thermally, the casting material bordering the previous strip 19 forms a guide surface 28 of a channel 29 after it has become rigid or hardened, wherein the casting material placed into the space 17 seals the channel 29 along

its guide surface 28 toward the base body 17 and the outer body 19. The strip 26 can, for example, also extend helically over the length L of the barrel 02, preferably in its outer area. A radial extension of the strip 26, i.e. its height h26 can be as great as the distance a19 between the base body 17 and the outer body 19 (Fig. 6a). However, preferably the height h26 of the strip 26 is made shorter than the distance a19 between the base body 17 and the outer body 19 (Fig. 6b), so that when the space 27 between the base body 17 and the outer body 19 is filled, the casting material forms a bottom on the surface 18 of the base body 17. In both cases the height h26 of the strip 26 corresponds to the height h26 of the channel 29. When in the course of the operation of the rotating body 01 a temperature-control medium flows through the channel 29 formed from the removable strip 26, the casting material forms a thermal insulating layer toward the base body 17 which is particularly effective if the channel 29 has a bottom toward the base body 17. The temperature-control medium is only active toward the outer body 19. The base body 17 remains protected against thermal effects. The casting material is used as an insulating material in this way. For achieving this effect, a casting material with glass beads, preferably hollow glass bodies, in particular hollow glass spheres, sprinkled in, is particularly advantageous. It is also advantageous to select an insulating material, i.e. a synthetic resin, whose thermal coefficient of expansion corresponds as closely as possible to that of of the material of the base body 17 and the outer body 19 and therefore matches it. In the course of their

assembly, the outer body 19 and the base body 17 are oriented concentrically in respect to each other.

With the fourth embodiment, at least the barrel 02 of the rotating body 01 has a base body 17 with a cylindrical surface 18 and an outer body 19 surrounding the surface 18 of the base body 17 (Figs. 6a and 6b), wherein an inner diameter D19 of the outer body 19 is greater than an outer diameter D17 of the base body 17, wherein the rotating body 01 is distinguished in that a casting material, preferably an insulating material, in particular a castable insulating material, has been placed into a space 27 between the surface 18 of the base body 17 and the inside 24 of the outer body 19, and the casting material, or the insulating material forms at least one channel 29 in the space 27. It is advantageous if the inner diameter D19 of the outer body 19 is between 5 mm and 30 mm, in particular 20 mm, greater than the outer diameter D17 of the base body 17, and if the outer body 19 is concentrically arranged around the base body 17. However, the channel 29 can also wind in a helical shape around the base body 17, preferably in the outer area of the barrel 02. Similar to the way in the previous exemplary embodiments, a temperature-control medium can flow through the channel 29. It is advantageous in connection with the preferred use of the rotating body 01 if the outer body 19 is embodied as a steel pipe and the base body 17 is forged.

As represented in Fig. 7, a fifth embodiment provides a rotating body 01 of a printing press with a barrel 02, wherein a shaft 31 of a diameter D31 preferably passing through the barrel 02 is arranged centered in the barrel 02,

wherein the shaft 31 has a higher resistance against mechanical stress on the rotating body 01, preferably a greater physical strength, in particular a higher endurance, breaking or flexing resistance, than the barrel 02, and wherein at least one channel 32 leading into the barrel 02 is provided in the shaft 31. In particular, the shaft consists of a high-strength material with an appropriate module of elasticity for providing in it a channel 32 to the inside of the barrel 02 of a diameter D32 and with as large as possible a cross-sectional surface A32 in comparison with the cross-sectional surface A31 of the shaft 31, without reducing the physical properties of the entire rotating body 01, such as for example its endurance, breaking or flexing resistance. Since the physical properties of the material being used for the barrel 02, for example an iron-containing or aluminum-containing material, are not too great, it would not be possible to realize a channel 32 of a large cross-sectional surface A32 for introducing as large as possible a volume flow of a temperature-control medium into a hub of the barrel 02 made of the same material as the remaining barrel 02 without negatively affecting the physical properties of the rotating body 01. However, the physical strength of the material of the shaft 31 should permit the provision of a channel 32 with a large cross-sectional surface A32 in it. An axial bore with a diameter 32 between 8 mm and 30 mm for forming the channel 32 can be advantageously cut into the shaft 31, wherein the diameter D32 is approximately 40% of the diameter D31 of the shaft 31. With this, the cross-sectional surface A32 of the channel 32 can be approximately 20% or more of the cross-sectional surface A31 of the shaft

31. In spite of the formation of such a channel 32 in the shaft 32, the geometric dimensions of the shaft 32 in comparison with conventional shafts 32 should remain unchanged and should in particular not be increased, instead, with constant mechanical stress, the increased physical strength of the shaft 32 compensates its weakening because of the channel 32 cut into it. The channel 32 is formed on at least one end 33 of the shaft 31 and extends in the barrel 02, for example, over only a portion of the length L of the barrel 02. Advantageously, the shaft 31 itself extends as a component, which in respect to its structure and its material is formed homogeneously and as one piece, at least over the length L of the barrel 02, wherein this length L - as already mentioned - can reach up to 2400 mm. Moreover, the shaft 31 can be embodied at its ends with journals 22, 23 for seating and for a connection with a drive mechanism for the rotary movement of the rotating body 01. A temperature-control medium for controlling the temperature of the barrel 02 is conducted through the channel 32 into the barrel 02 in that, for example, a rotary lead-through is connected with the shaft 31, i.e. in particular with at least one of its journals 22, 23. For controlling the temperature of the shell face 07 of the barrel 02 which, for example, can be covered with at least one dressing, the barrel 02 has at least one channel 29 extending underneath the shell face 07, wherein the channel 29 of the barrel 02 is connected with the channel 32 of the shaft 31 by means of at least one line extending substantially radially in respect to the barrel 02, for example a radial bore 34, or by means of an annular groove 37 represented in Fig. 2. In a preferred embodiment

at least the barrel 02 is made of a casting material, wherein the channel 29 of the barrel 02 is enclosed, for example, by the cast material of the barrel 02, or is designed in accordance with one of the previously described embodiments of the rotary body 01. Therefore the barrel 02 can be made of, for example, a gray cast material, cast steel or cast aluminum, while the shaft 32 is for example made of a preferably alloyed or tempered steel, in particular high-strength steel with an appropriate module of elasticity, so that the rotating body 01 is constructed from two components of preferably different material with different physical properties and with melting points which are different from each other. The shaft 31 is introduced into the barrel 02, for example by means of a non-positive, material-to-material, or positive connection, and is connected with the barrel 02 in such a way that the channels 29, 32 formed in the barrel 02 and the shaft 31 have a connection through which the temperature-control medium can flow. If the physical strength of the shaft 31 permits, the shaft 31 can be cast in the barrel 02. However, in the preferred embodiment the cast barrel 02 is in particular attached to the shaft 31 by being shrunk onto it. Further possible joining techniques consist in gluing the shaft 31 into the barrel 02, or to clamp it by forming, or the introduction of suitable means such as, for example, wedges or a tongue-and-groove connection. In connection with a method for producing the rotating body 01, wherein a shaft 31 with a channel 32 of a large cross-sectional surface A32 is arranged centered in the barrel 02, and wherein the shaft 31 is introduced into a barrel 02 produced by means of casting technology after it has

solidified, the danger of a thermal deformation of the shaft 31, or at least of thermal stresses in the shaft 31, is avoided, which would otherwise exist, in particular in connection with slim rotating bodies 01 of a relatively small diameter D2 and therefore with a large axial length L, as previously mentioned. With this method heating, or especially heat-soaking and softening of the shaft 31 by means of the liquefied casting material of the barrel 02, is prevented, since the shaft 31 is not embedded in the casting material of the barrel 02 liquefied by heat, but instead the shaft 31 is introduced into the cast barrel 02 after it has solidified. This method contributes to the production with great precision of rotating bodies 01 with a shell face 07 which is to be temperature-controlled.

A method for the temperature-control of at least one barrel 02 of a rotating body 01 of a printing press, wherein at least the barrel 02 has at least one hollow body 03, 04, or channel 14, 16, 21, 29, with an inflow 08 and an outflow 09 for the temperature-control medium, through which a preferably liquid temperature-control medium flows at a constant flow volume, is provided in that an amount of heat to be exchanged between the barrel 02 and the temperature-control medium in the hollow body 03, 04, or channel 14, 16, 21, 29 over a distance s between the inflow 08 and the outflow 09, wherein the distance s preferably corresponds to the length L of the barrel 02, but at least to the length of the print-performing area on the shell face 07 of the barrel 02, is maintained constant by means of the adjustment of a flow speed v08, v09 of the temperature-control medium. In

connection with this, an embodiment of the hollow body 03, 04, or of the channel 14, 16, 21, 29 can be found in Fig. 8.

With this method the flow speed v08, v09 of the temperature-control medium can be adjusted in that, for example, a cross-sectional surface A09 of the hollow body 03, 04 or channel 14, 16, 21, 29 at the outflow 09 is changed in comparison to a cross-sectional surface A08 of the hollow body 03, 04 or channel 14, 16, 21, 29 at the inflow 08. Or, the flow speed of the temperature-control medium can be adjusted in that a depth t09 of the hollow body 03, 04 or channel 14, 16, 21, 29 at the outflow 09 is changed in comparison with the depth t08 of the hollow body 03, 04 or channel 14, 16, 21, 29 at the inflow 08. To this end it is provided that a contact surface A07 of the temperature-control medium flowing through the hollow body 03, 04 or channel 14, 16, 21, 29 is kept constant. It is achieved by means of these steps that the heat exchange between the shell face 07 of the barrel 02 and the temperature-control medium remains constant because, for example in connection with a steadily warming temperature-control medium because of the cooling of the contact surface A07, the flow speed v09 at the outflow 09 is reduced in comparison with the flow speed v08 at the inflow 08, so that the dwell time of the temperature-control medium at the contact surface A07 is proportionally increased. On the other hand, it is also possible to maintain the flow speed v08, v09 of the temperature-control medium constant over the distance s and to change the contact surface A07 which the temperature-control medium has toward the shell face 07 of the barrel 02 by changing the geometry

of the contact surface A07 or its distance toward the shell face 07 of the barrel 02.

In a sixth embodiment, the rotating body 01 of a printing press has a barrel 02, wherein at least one hollow body 03, 04 or a channel 14, 16, 21, 29, through which a temperature-control medium flows, and with an inflow 08 and an outflow 09 for the temperature-control medium, is at least located in the barrel 02, wherein an amount of heat in the hollow body 03, 04 or a channel 14, 16, 21, 29, to be exchanged between the barrel 02 and the temperature-control medium over a distance s between the inflow 08 and the outflow 09 is constant by means of an adjustment of a flow speed v08, v09 of the temperature-control medium. In this case the distance s advantageously corresponds at least to the print-performing area along the length L of the barrel 02.

As described in connection with the method, the flow speed v08, v09 of the temperature-control medium can be adjusted in that, for example, a cross-sectional surface A09 of the hollow body 03, 04 or the channel 14, 16, 21, 29, at the outflow 09 is changed in comparison with a cross-sectional surface A08 of the hollow body 03, 04 or the channel 14, 16, 21, 29 at the inflow 08. Or, the flow speed of the temperature-control medium can be adjusted in that a depth t09 of the hollow body 03, 04 or channel 14, 16, 21, 29 at the outflow 09 changes in comparison with the depth t08 of the hollow body 03, 04 or channel 14, 16, 21, 29 at the inflow 08. With this rotating body 01, a contact surface A07 of the temperature-control medium flowing through the hollow body 03, 04 or channel 14, 16, 21, 29 and oriented toward the

shell face 07 of the barrel 02 does not change. Also, the flow speed v08, v09 of the temperature-control medium along the distance s can remain constant and the contact surface A07 which the temperature-control medium has toward the shell face 07 of the barrel 02 can be changed between the inflow 08 and the outflow 09 in its geometry or its distance from the shell face 07 of the barrel 02.

This sixth embodiment of the rotating body 01 is particularly suited for designs in which the inflow 08 and outflow 09 of the temperature-control medium are arranged on the same end 11 of the barrel 02. For example, the effect of this sixth embodiment of the rotating body 01 can be achieved in that an insert, which changes the cross section along the distance s in a desired way, is introduced into a hollow body 03, 04 or channel 14, 16, 21, 29 of constant cross section, wherein this insert can be embodied to be wedge-shaped, for example. If the insert for the hollow body 03, 04 or channel 14, 16, 21, 29 is embodied as a solid wedge, for example as a rod whose cross section is embodied in a desired way, in particular a plastic rod, this wedge can be introduced with a material-to-material contact or positive contact into the hollow body 03, 04 or channel 14, 16, 21, 29, for example by gluing or by means of a press fit. Advantageously the insert consists of an insulating material, preferably a castable insulating material, for example a synthetic resin, with sprinkled-in hollow glass bodies, for example hollow glass spheres, which is preferably introduced into the hollow body 03, 04 or channel 14, 16, 21, 29 by means of a casting process or injection-molding process, and which insulates the temperature-control medium against the base body 17 of the

barrel 02 because of its thermal damping effect. In this embodiment the insert lines the hollow body 03, 04 or channel 14, 16, 21, 29 at its inner wall, i.e. at its wall facing the temperature-control medium, at least partially. With a channel 14, 16, 21, 29 open toward the base body 17 arranged in the outer body 19, the insert placed, for example, into the channel 14, 16, 21, 29 covers the channel 14, 16, 21, 29 toward the base body 17.

The use of an insert has the advantage that the hollow body 03, 04 or the channel 14, 16, 21, 29 can be realized in the barrel 02 of the rotating body 01 for example by means of a conventional pipe, in particular a steel pipe, or by drilling or machining, and an effect on the flow behavior of the temperature-control medium takes place in a production step separated from the insertion of the hollow body 03, 04 or the channel 14, 16, 21, 29 into the barrel 02. Moreover, it is possible by means of an insert into the hollow body 03, 04 or the channel 14, 16, 21, 29 to achieve in a simple manner a thermal insulation of the temperature-control medium against the base body 17.

A further method for producing a rotating body 01 with a thermally insulated base body 17, as well as a rotating body 01 produced in accordance therewith, will now be explained by means of Figs. 9 to 11. A cylindrical sleeve 38 is pushed onto the preferably closed cylindrical surface 18 of the base body 17 extending over the axial length of the rotating body 01, wherein the sleeve 38 has along its circumference several hollow spaces 21 in the form of, for example, grooves 21 extending axially in respect to the base body 17, wherein preferably every groove 21 can be used as a

flow channel 21. Preferably several sleeves 38, preferably of the same width, have been lined up over the axial length of the rotating body 01, for example by pushing them on the rotating body 01, in such a way that all grooves 21 at the outside of the sleeves 38 fit each other to form a flow channel 21 extending over the axial length of the rotating body 01. However, the sleeves 38 can also be produced with different widths, for example, so that sleeves 38 of different widths can fit to form almost any arbitrary axial length of the rotating body 01.

A channel-like inflow 08 for introducing the heat-carrying medium into the rotating body 01 is provided at at least one end 11 of the rotating body, or at an end 33 of a shaft 31 extending through the rotating body 01, wherein the heat-conducting medium is conducted, for example, in the interior of the shaft 31 through the rotating body 01 close to the opposite end 11 of the rotating body 01. By means of preferably several radial bores 34, the heat-conducting medium is conducted from there to the front openings of the grooves 21 of the sleeve 38 which, in the axial direction of the rotating body 01, is the outermost one and is introduced into the flow channels 21 embodied as grooves 21, after which the heat-conducting medium flows through the grooves 21 in the direction of the end 11 of the rotating body 01 at which the heat-conducting material had been introduced into the rotating body 01. The heat-conducting medium exiting from the end openings of the grooves 21 of the sleeve 38 which, in the axial direction of the rotating body 01, is the last can be conducted by means of radial bores 34 to a channel-like

outflow 09 for the collective removal of the heat-conducting medium from the rotating body 01.

In this embodiment all sleeves 38 are preferably made of a plastic material, for example in an injection-molding process, and are made, for example, of polyamide. The sleeves 38 are made in particular of a thermally insulating material. The grooves 21 formed in the outside of the sleeve 38 are preferably formed in the course of injection-molding the sleeve 38. However, the grooves 21 can also be cut into the outer surface of the sleeve 38 by milling.

Following the placement of the sleeves 38, which are preferably required for the entire axial length of the rotating body 01, onto the base body 17, and the alignment of their respective grooves 21 for forming continuous flow channels 21, the sleeves 38 are fixed in place on the base body 17, preferably by a material-to-material connection, for example by gluing, and are fastened. Thereafter an outer body 19, for example embodied as a cylindrical pipe, is placed on the lined-up sleeves 38 in such a way that the grooves 21 cut into the sleeves 38 are covered. Strips 39 formed between the individual grooves 21 prevent leaks in which the heat-conducting medium flowing through the flow channels 21 would change from one groove 21 into a neighboring groove 21 in an uncontrolled manner. The preferably thin-walled outer body 19 is pushed onto the sleeves 38, for example with a positive connection, and is fastened to the sleeves 38, or to the base body 17, or to both, preferably in a material-to-material connection, for example by welding or gluing. With this, at least one

cylindrical sleeve 38 made of a thermally insulating material has been placed into the space 27 between the surface 18 of the base body 17 and the inside 24 of the outer body 19. The outer body 19 preferably is made of a corrosion-proof and wear-resistant metallic material.